

TITLE: STORAGE MEDIUM STORING  
PROGRAM DIRECTING COMPUTER TO  
CONTROL OPTIMIZATION...  
INVENTORS: Masanori KIRA  
SERIAL NO.: Unassigned  
DOCKET NO.: 826.1897

```
000010 IDENTIFICATION DIVISION.
000020 PROGRAM-ID. PRG1.
000030
000040 ENVIRONMENT DIVISION.
000050 INPUT-OUTPUT SECTION.
000060 FILE-CONTROL.
000070 SELECT IFILE01 ASSIGN SYSIN
000080 .
000090
000100 DATA DIVISION.
000110 FILE SECTION.
000120 FD IFILE01.
000130 01 IREC01. *>UNUSED
000140 03 IDATA11 PIC X(20). *>UNUSED
000150 03 IDATA12 PIC X(20). *>UNUSED
000160 03 IDATA13 PIC X(20). *>UNUSED
000170 03 IDATA14 PIC X(20). *>UNUSED
000180 WORKING-STORAGE SECTION.
000190 01 WREC01.
000200 03 WDATA11 PIC 9(02).
000210 03 WDATA12 PIC 9(02). *>UNUSED
000220 03 WDATA13 PIC 9(02). *>UNUSED
000230 03 WDATA14 PIC 9(02).
000240 01 WREC02. *>UNUSED
000250 03 WDATA21 PIC X(40). *>UNUSED
000260 03 WDATA22 PIC X(40). *>UNUSED
000270 77 WDATA71 PIC 9(02). *>UNUSED
000280 77 WDATA72 PIC 9(02).
000290
000300 PROCEDURE DIVISION.
000310 MOVE 1 TO WDATA11 OF WREC01.
000320 MOVE 2 TO WDATA14 OF WREC01.
000330 COMPUTE WDATA72 = WDATA11 OF WREC01 + WDATA14 OF WREC01.
000340 DISPLAY WDATA72.
000350 STOP RUN.
```

FIG. 1 (RELATED ART)

```
000010 IDENTIFICATION DIVISION.
000020 PROGRAM-ID. PRG1.
000030
000040 ENVIRONMENT DIVISION.
000050 INPUT-OUTPUT SECTION.
000060 FILE-CONTROL.
000070 SELECT IFILE01 ASSIGN SYSIN
000080 .
000090
000100 DATA DIVISION.
000110 FILE SECTION.
000120 FD IFILE01.
000130 01 IREC01. *>UNUSED
000140 03 IDATA11 PIC X(20). *>UNUSED
000150 03 IDATA12 PIC X(20). *>UNUSED
000160 03 IDATA13 PIC X(20). *>UNUSED
000170 03 IDATA14 PIC X(20). *>UNUSED
000180 WORKING-STORAGE SECTION.
000190 01 WREC01.
000200 03 WDATA11 PIC 9(02).
000210 03 WDATA12 PIC 9(02). *>UNUSED
000220 03 WDATA13 PIC 9(02). *>UNUSED
000230 03 WDATA14 PIC 9(02).
000240* DELETED
000250* DELETED
000260* DELETED
000270* DELETED
000280 77 WDATA72 PIC 9(02).
000290
000300 PROCEDURE DIVISION.
000310 MOVE 1 TO WDATA11 OF WREC01.
000320 MOVE 2 TO WDATA14 OF WREC01.
000330 COMPUTE WDATA72 = WDATA11 OF WREC01 + WDATA14 OF WREC01.
000340 DISPLAY WDATA72.
000350 STOP RUN.
```

FIG. 2 (RELATED ART)

```
#include <stdio.h>

struct {
    char  idata11[20]; /*UNUSED*/
    char  idata12[20]; /*UNUSED*/
    char  idata13[20]; /*UNUSED*/
    char  idata14[20]; /*UNUSED*/
} irec01; /*UNUSED*/

void main(void) {
    struct {
        short wdata11;
        short wdata12; /*UNUSED*/
        short wdata13; /*UNUSED*/
        short wdata14;
    } wrec01;

    struct {
        char  wdata21[40]; /*UNUSED*/
        char  wdata22[40]; /*UNUSED*/
    } wrec02; /*UNUSED*/

    short wdata71; /*UNUSED*/
    short wdata72;

    wrec01.wdata11 = 1;
    wrec01.wdata14 = 2;
    wdata72 = wrec01.wdata11 + wrec01.wdata14;
    printf("%d\n", wdata72);
}
```

F I G. 3 ( R E L A T E D   A R T )

```
#include <stdio.h>

struct {
    char  idata11[20]; /*DELETED*/
    char  idata12[20]; /*DELETED*/
    char  idata13[20]; /*DELETED*/
    char  idata14[20]; /*DELETED*/
} irec01; /*DELETED*/

void main(void) {
    struct {
        short wdata11;
        short wdata12; /*UNUSED*/
        short wdata13; /*UNUSED*/
        short wdata14;
    } wrec01;

    /* DELETED */
    /* DELETED */
    /* DELETED */
    /* DELETED */

    /* DELETED */
    short wdata72;

    wrec01.wdata11 = 1;
    wrec01.wdata14 = 2;
    wdata72 = wrec01.wdata11 + wrec01.wdata14;
    printf("%d¥n", wdata72);
}
```

F I G . 4 ( R E L A T E D   A R T )

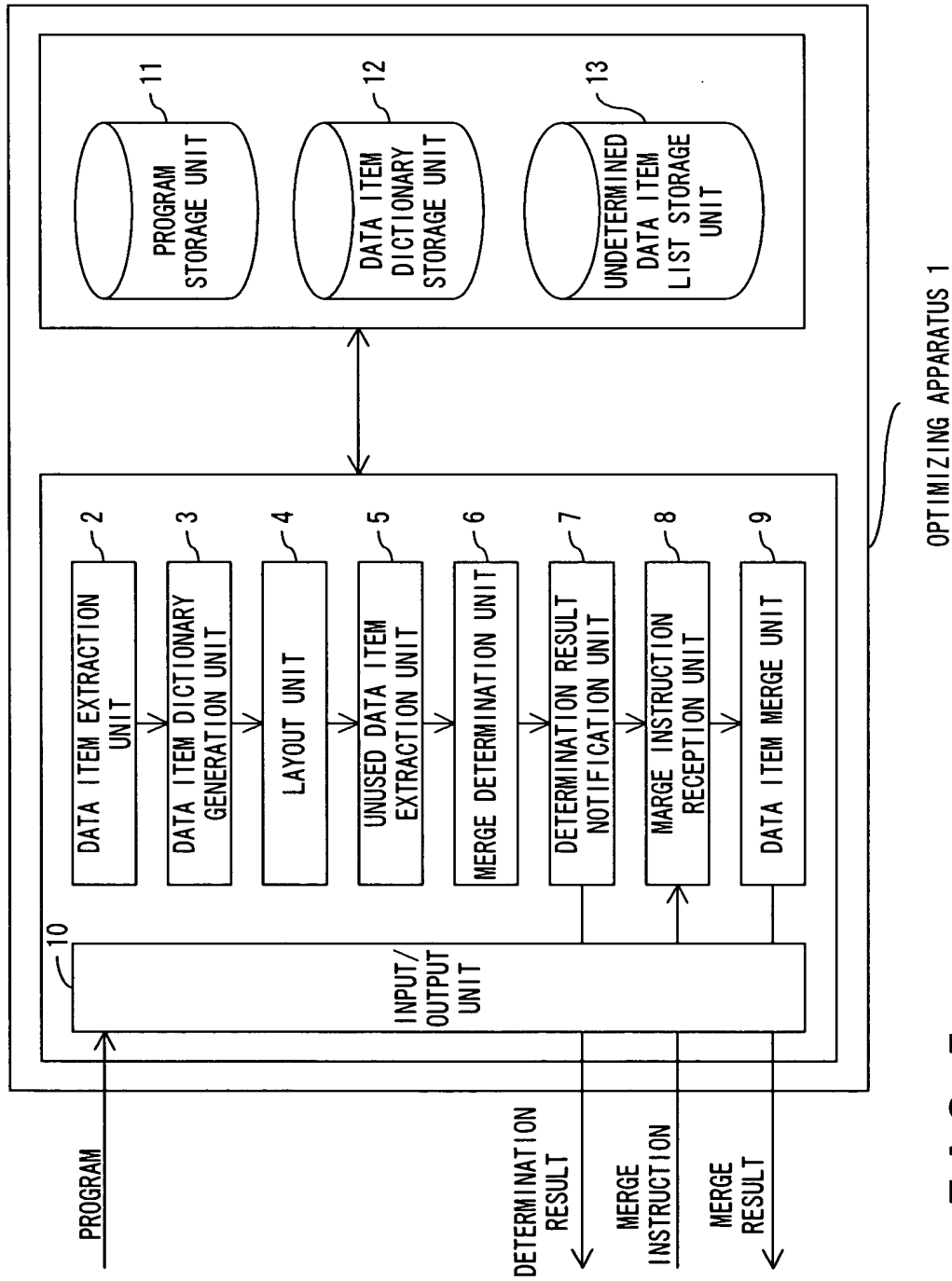
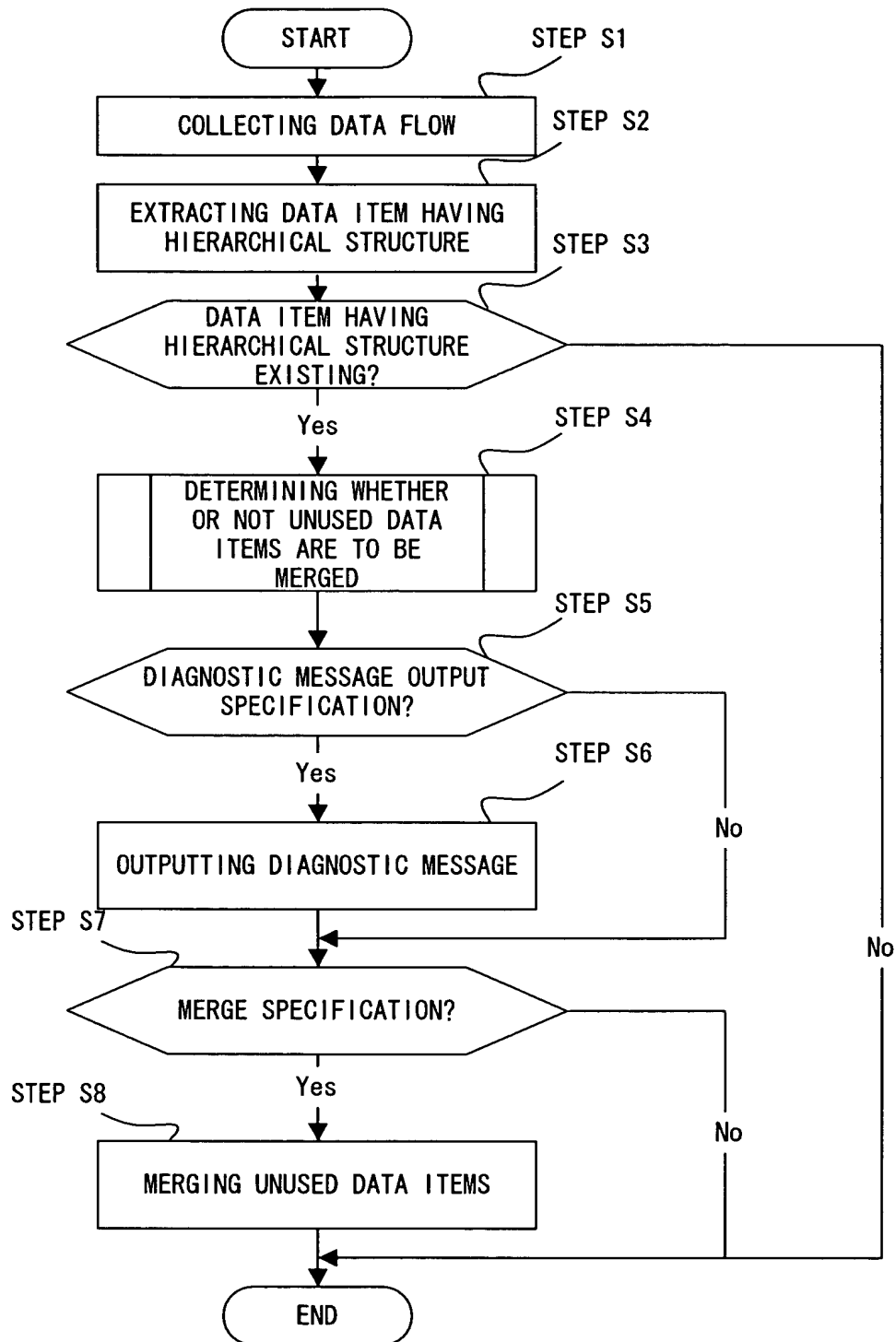


FIG. 5



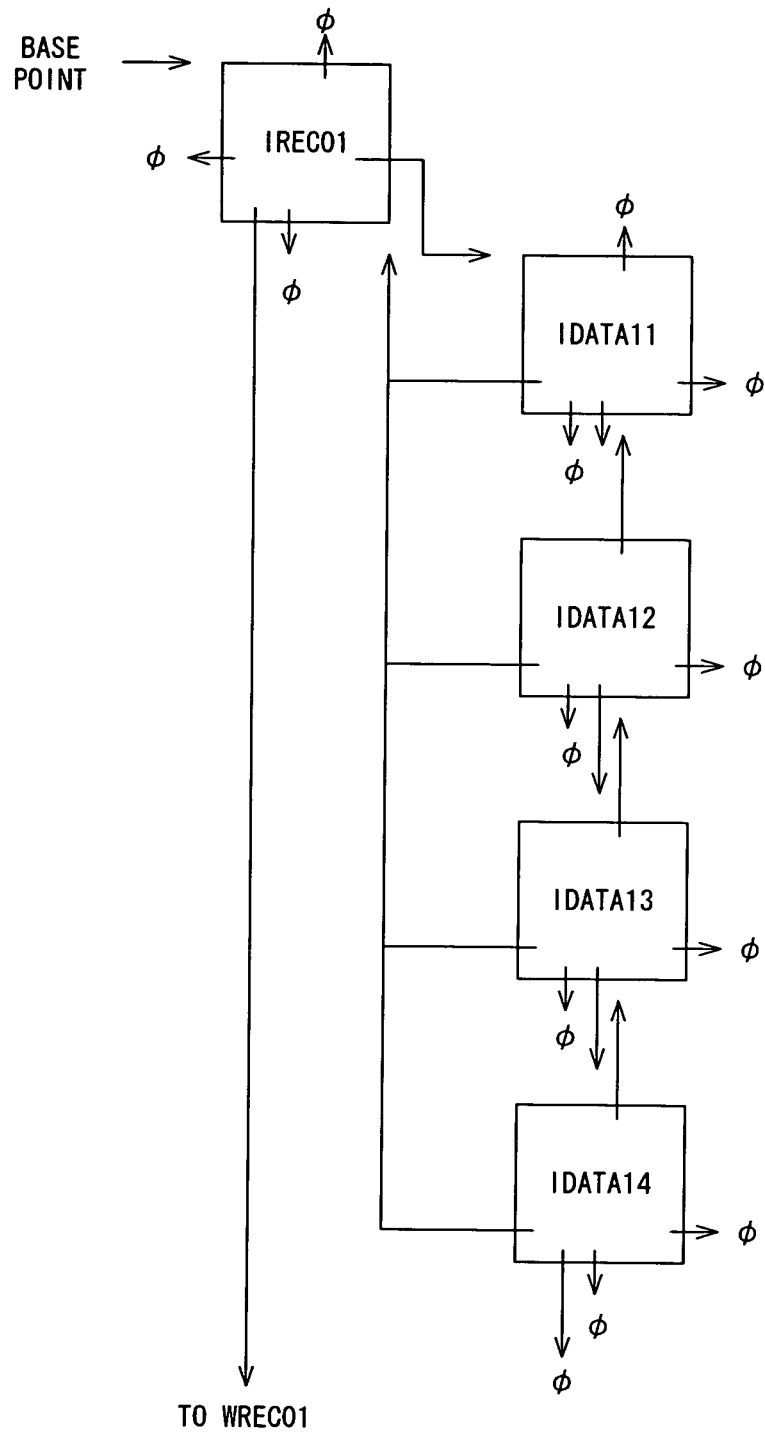
F I G . 6

```

000010 IDENTIFICATION DIVISION.
000020 PROGRAM-ID. PRG1.
000030
000040 ENVIRONMENT DIVISION.
000050 INPUT-OUTPUT SECTION.
000060 FILE-CONTROL.
000070     SELECT IFILE01 ASSIGN SYSIN
000080 .
000090
000100 DATA DIVISION.
000110 FILE SECTION.
000120 FD IFILE01.
000130 01 IREC01. *>UNUSED ↑ CONTINUOUS AREA
000140 03 IDATA11 PIC X(20). *>UNUSED |
000150 03 IDATA12 PIC X(20). *>UNUSED |
000160 03 IDATA13 PIC X(20). *>UNUSED |
000170 03 IDATA14 PIC X(20). *>UNUSED ↓
000180 WORKING-STORAGE SECTION.
000190 01 WREC01.
000200 03 WDATA11 PIC 9(02).
000210 03 WDATA12 PIC 9(02). *>UNUSED ↑ CONTINUOUS AREA
000220 03 WDATA13 PIC 9(02). *>UNUSED ↓
000230 03 WDATA14 PIC 9(02).
000240 01 WREC02. *>UNUSED ↑ CONTINUOUS AREA
000250 03 WDATA21 PIC X(40). *>UNUSED |
000260 03 WDATA22 PIC X(40). *>UNUSED ↓
000270 77 WDATA71 PIC 9(02). *>UNUSED
000280 77 WDATA72 PIC 9(02).
000290
000300 PROCEDURE DIVISION.
000310     MOVE 1 TO WDATA11 OF WREC01.
000320     MOVE 2 TO WDATA14 OF WREC01.
000330     COMPUTE WDATA72 = WDATA11 OF WREC01 + WDATA14 OF WREC01.
000340     DISPLAY WDATA72.
000350     STOP RUN.

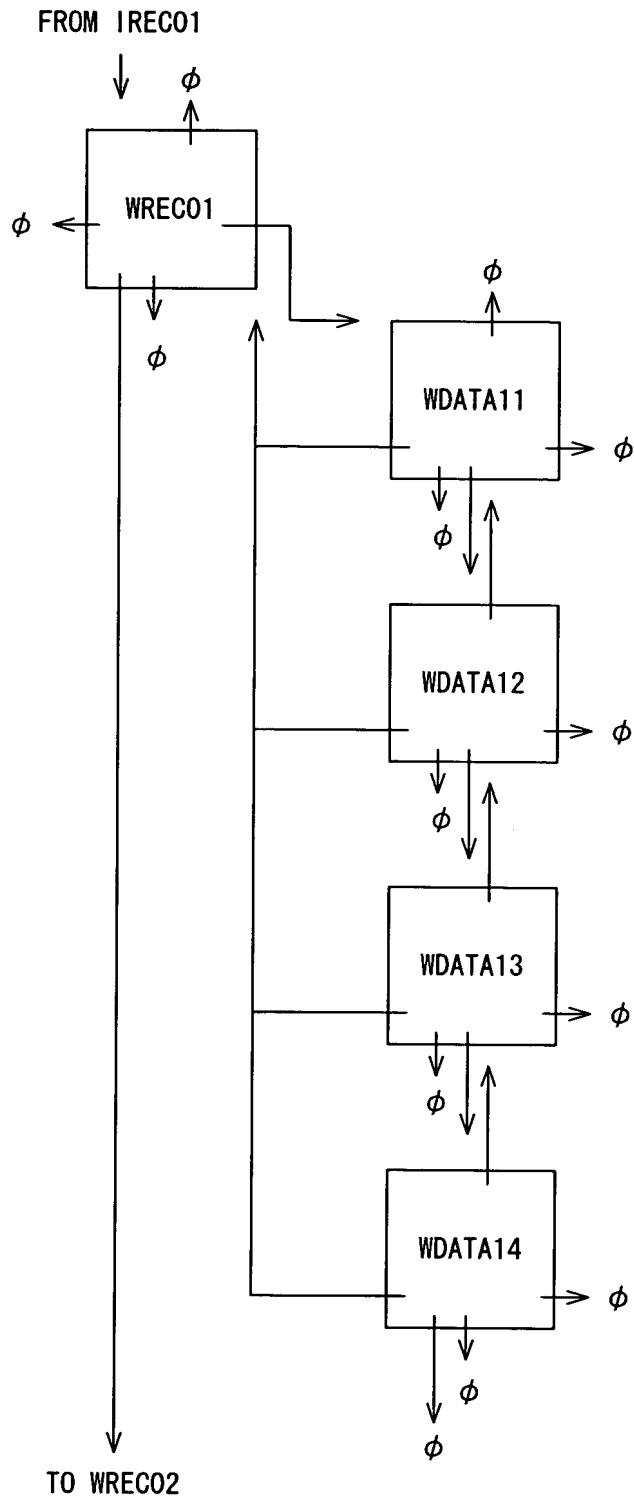
```

F I G. 7



F I G . 8





F I G . 9

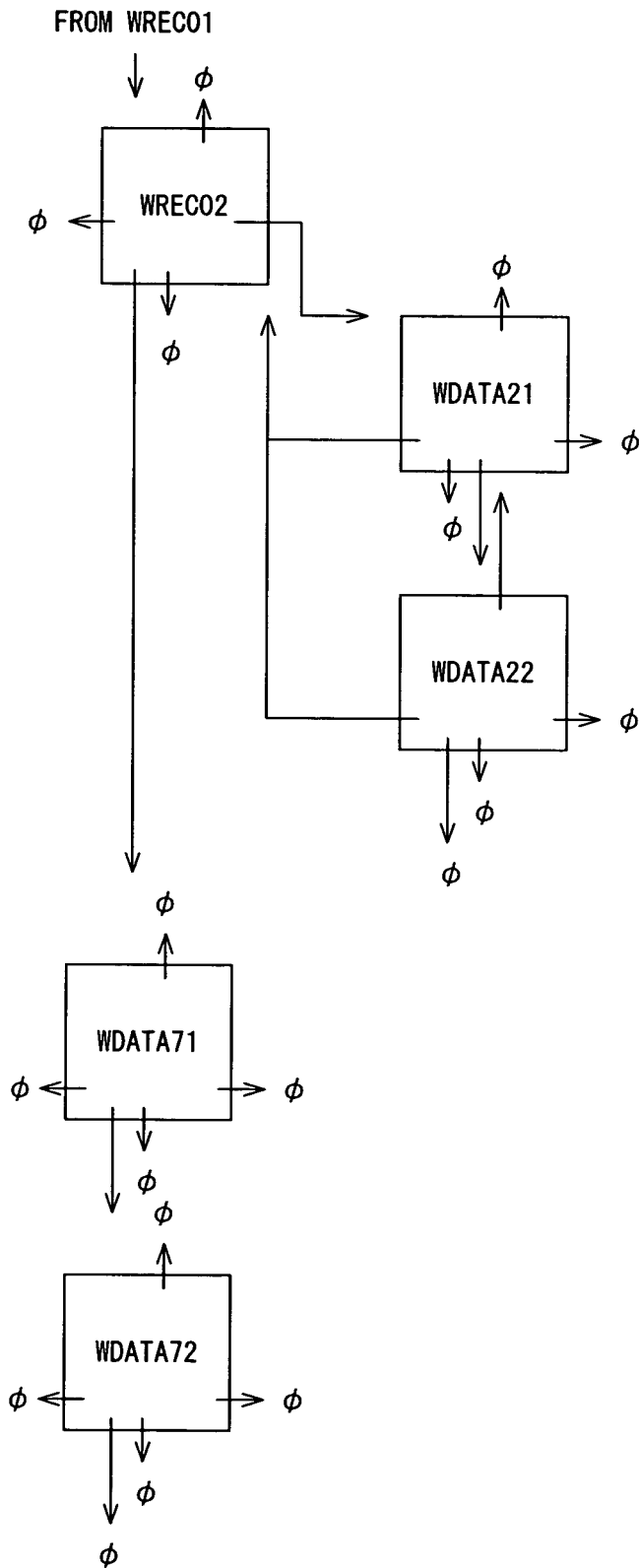
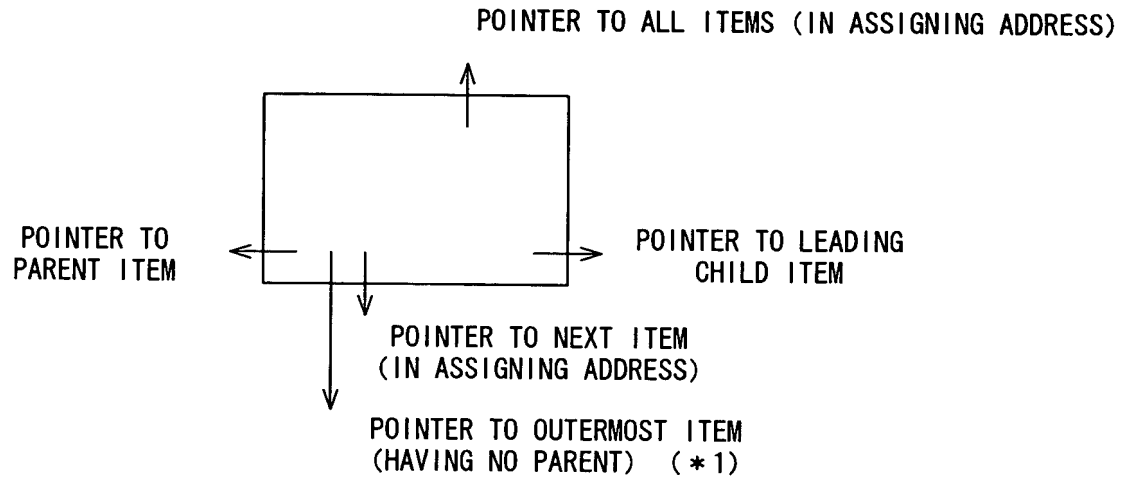
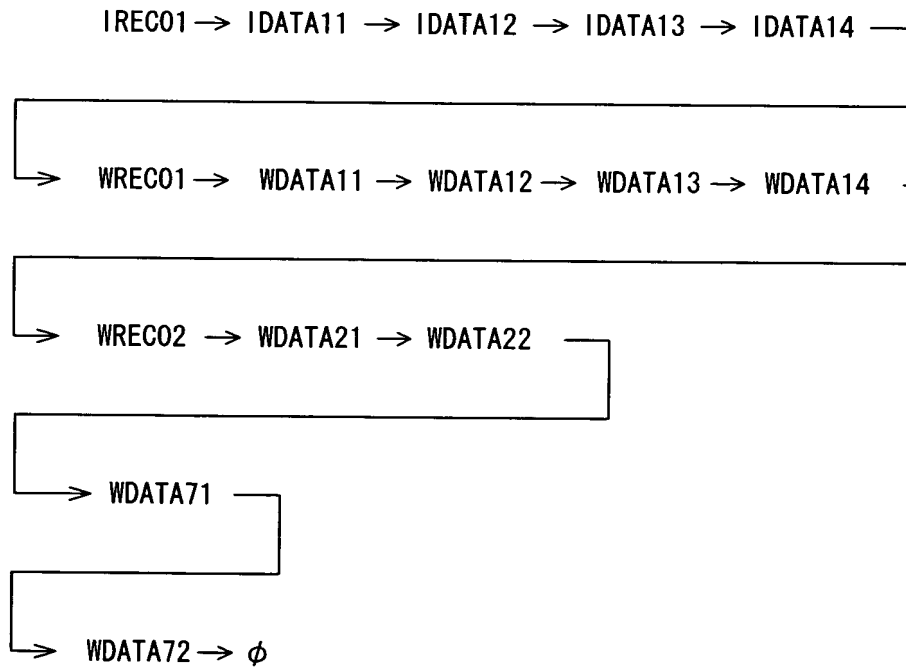


FIG. 10



F I G. 1 1 A



F I G. 1 1 B

TITLE: STORAGE MEDIUM STORING  
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INVENTORS: Masanori KIRA  
SERIAL NO.: Unassigned  
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RELATIVE DISPLACEMENT

+ 0	01 IREC01	02 IDATA11 PIC X(20)
+20		02 IDATA12 PIC X(20)
+40		02 IDATA13 PIC X(20)
+60		02 IDATA14 PIC X(20)
+80		

F I G. 1 2

RELATIVE DISPLACEMENT (byte)

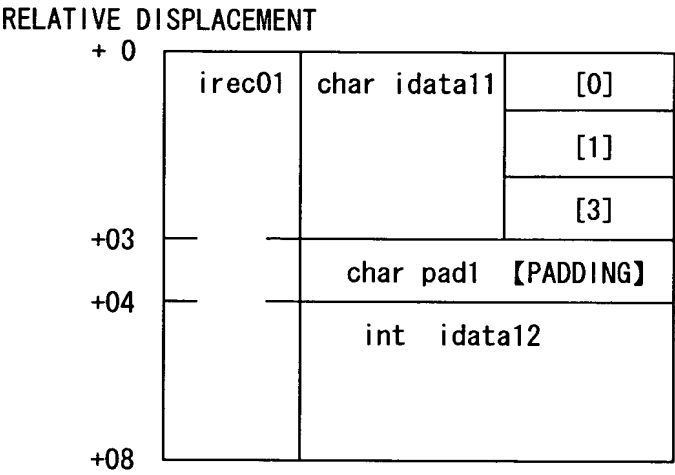
+ 0	01 DATA11	02 DATA21	03 DATA31 PIC X(5)
+ 5			
+ 6			03 FILLER PIC X [IDLE BYTE]
+ 8			03 DATA32 PIC S9(4) BINARY SYNCHRONIZED
+10			03 DATA33 PIC S9(4) BINARY SYNCHRONIZED
+11		02 DATA22	



RELATIVE DISPLACEMENT (bit)

+ 0	02 DATA22	03 DATA34 PIC 1(4) BIT SYNCHRONIZED
+ 4		03 FILLER PIC 1(4) BIT [IDLE BIT]
+ 8		

F I G. 1 3



F I G . 1 4

01 A1.	02 B1 X(10).
	02 B2 X(10).

FIG. 15 A

01 A1.	02 FILLER X(20).	↑ MERGE DIRECTION ↓
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FIG. 15 C

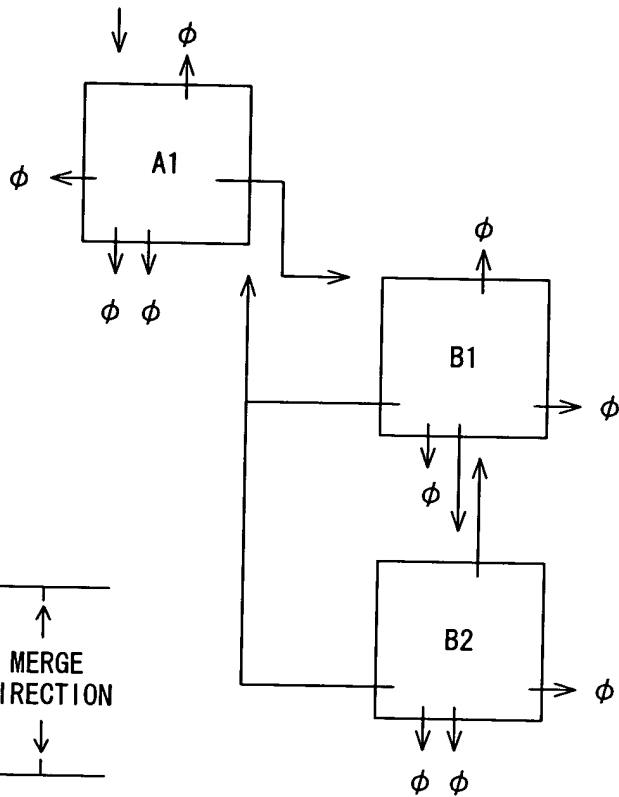


FIG. 15 B

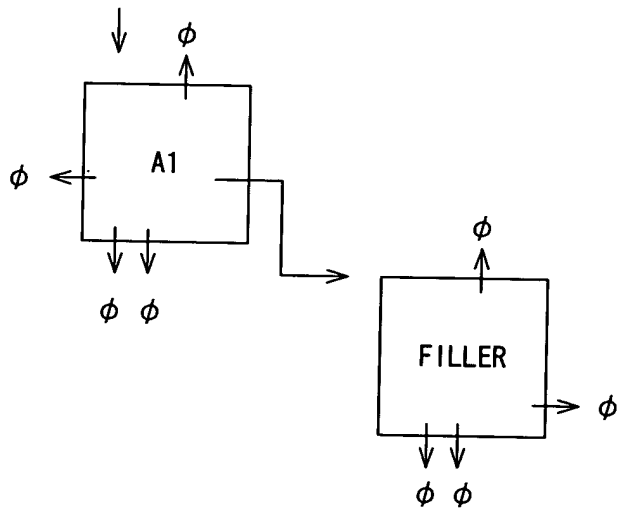


FIG. 15 D

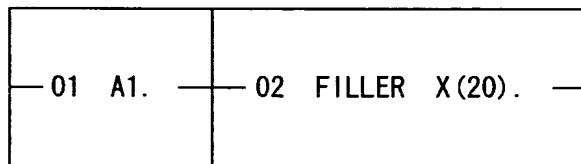


FIG. 16 A

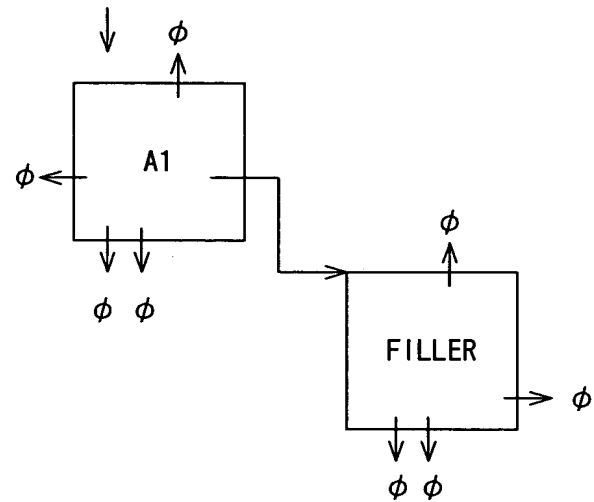


FIG. 16 B

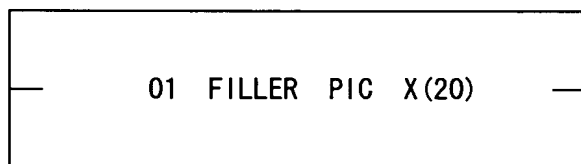


FIG. 16 C

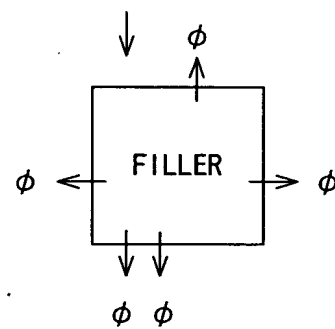
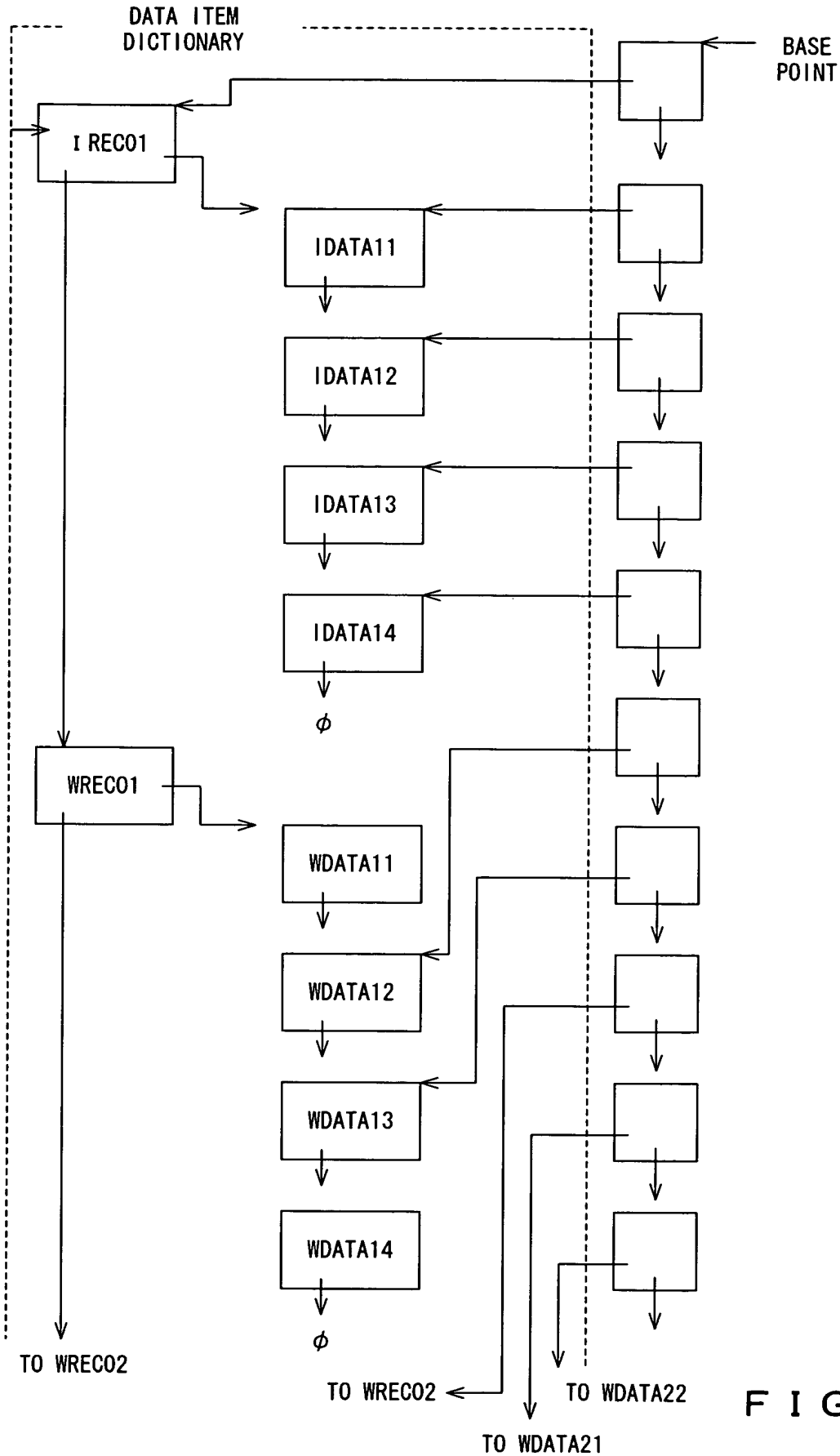


FIG. 16 D





F I G . 1 7

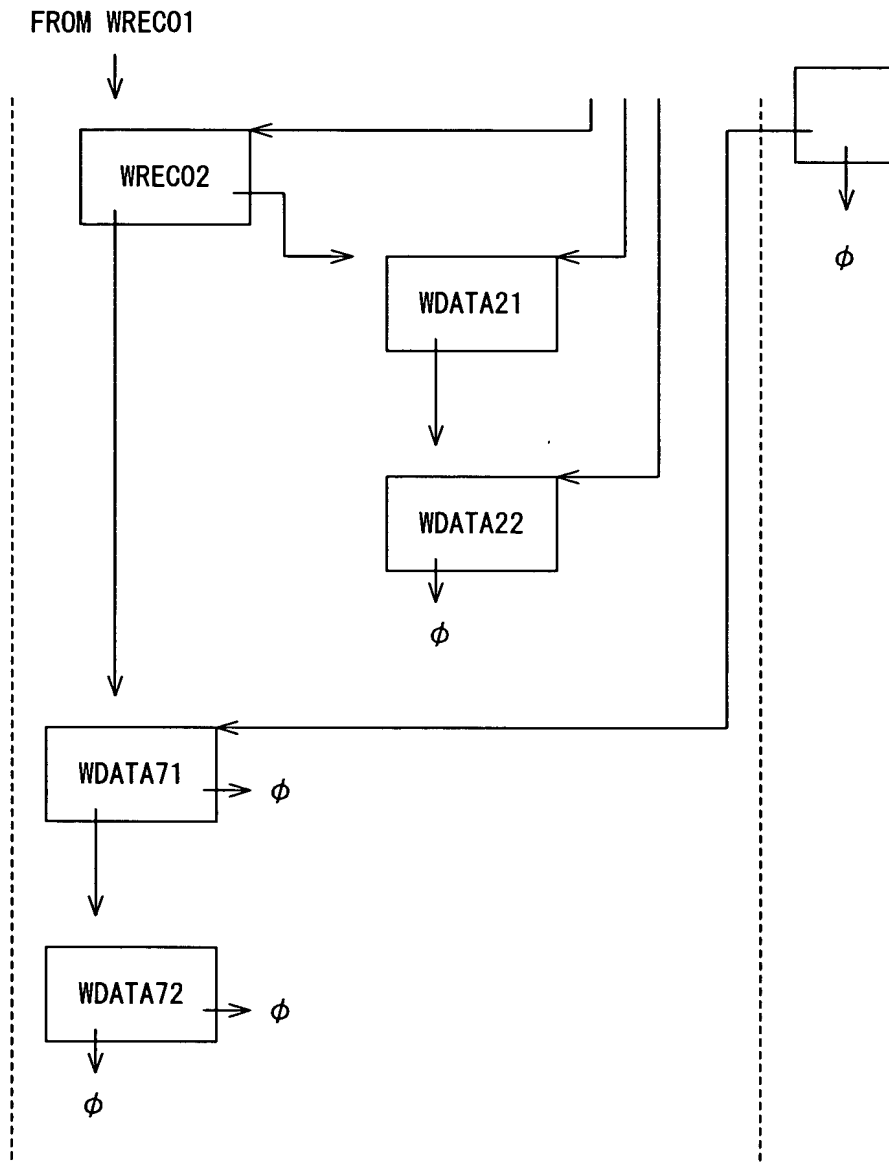
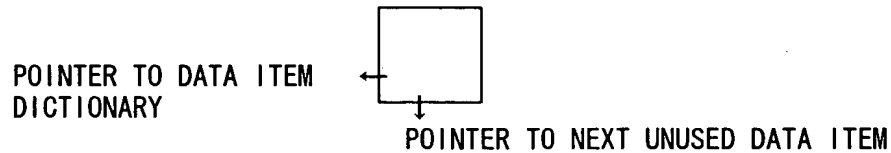


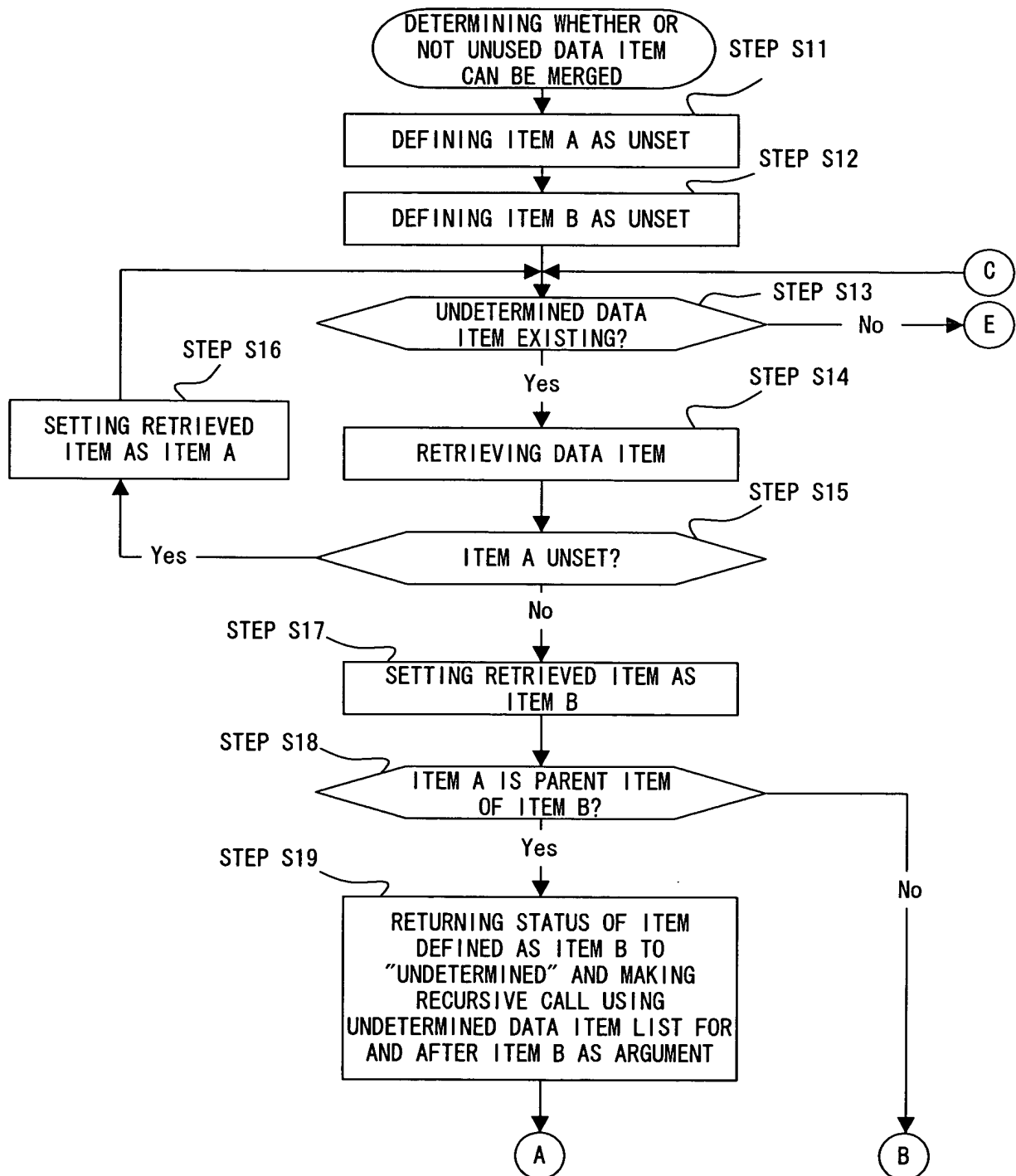
FIG. 18



INFORMATION OTHER THAN POINTER IS DESCRIBED AS FOLLOWS. EXECUTION  
RESULT OF MERGE DETERMINATION ON DATA ITEM GROUP IS HELD.

- STATUS: { UNDETERMINED | DETERMINED }
  - UNDETERMINED: MERGE DETERMINATION HAS NOT BEEN MADE ON DATA ITEM.
  - DETERMINED: MERGE DETERMINATION HAS BEEN MADE ON DATA ITEM.
- RESULT: { MERGE-ENABLED | DELETION-ENABLED }
  - MERGE-ENABLED: CAN BE MERGED WITH OTHER DATA ITEMS  
(CORRESPONDING TO ITEM A)
  - DELETION-ENABLED: CAN BE MERGED WITH OTHER DATA ITEMS  
(CORRESPONDING TO ITEM B)
- LENGTH: SIGNIFICANT LENGTH OF MERGED ITEM A WHEN "STATUS" IS  
MERGED-ENABLED.
- TYPE : SIGNIFICANT DATA TYPE OF MERGED ITEM A WHEN "STATUS" IS  
MERGE-ENABLED.

F I G. 1 9



F I G . 2 0

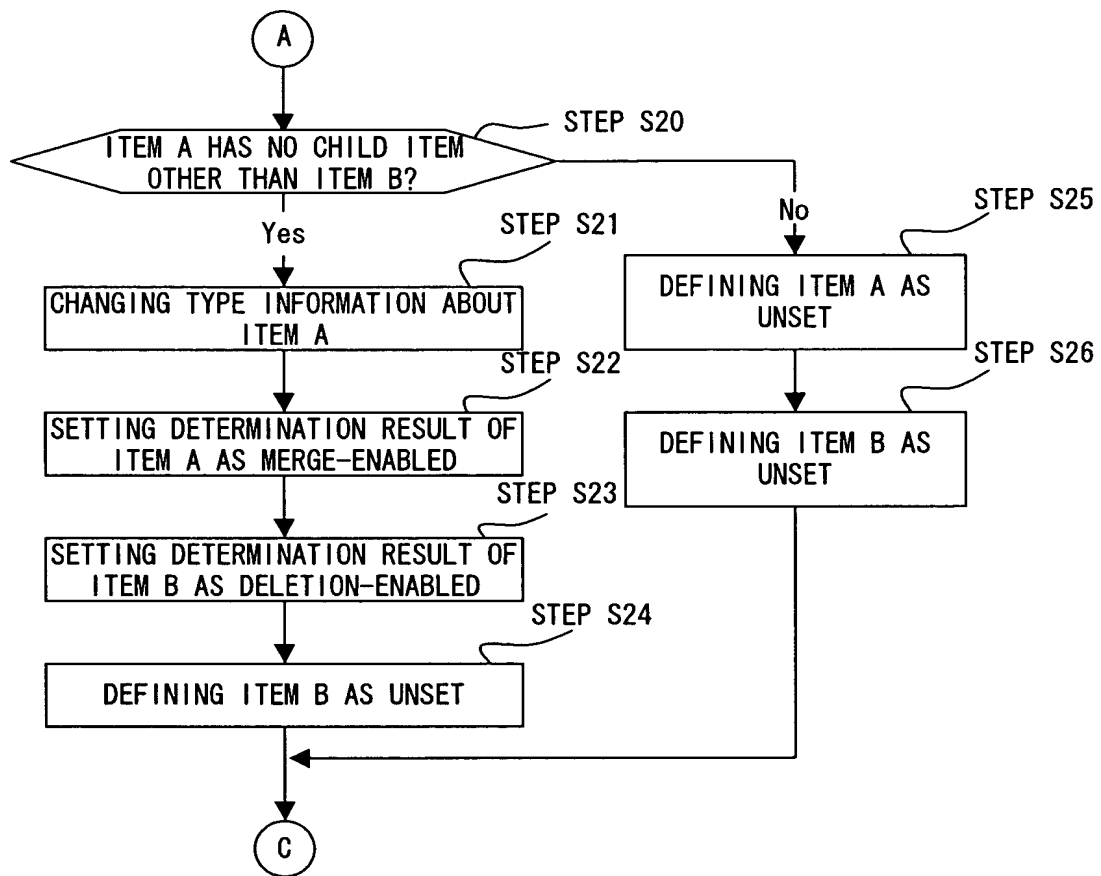
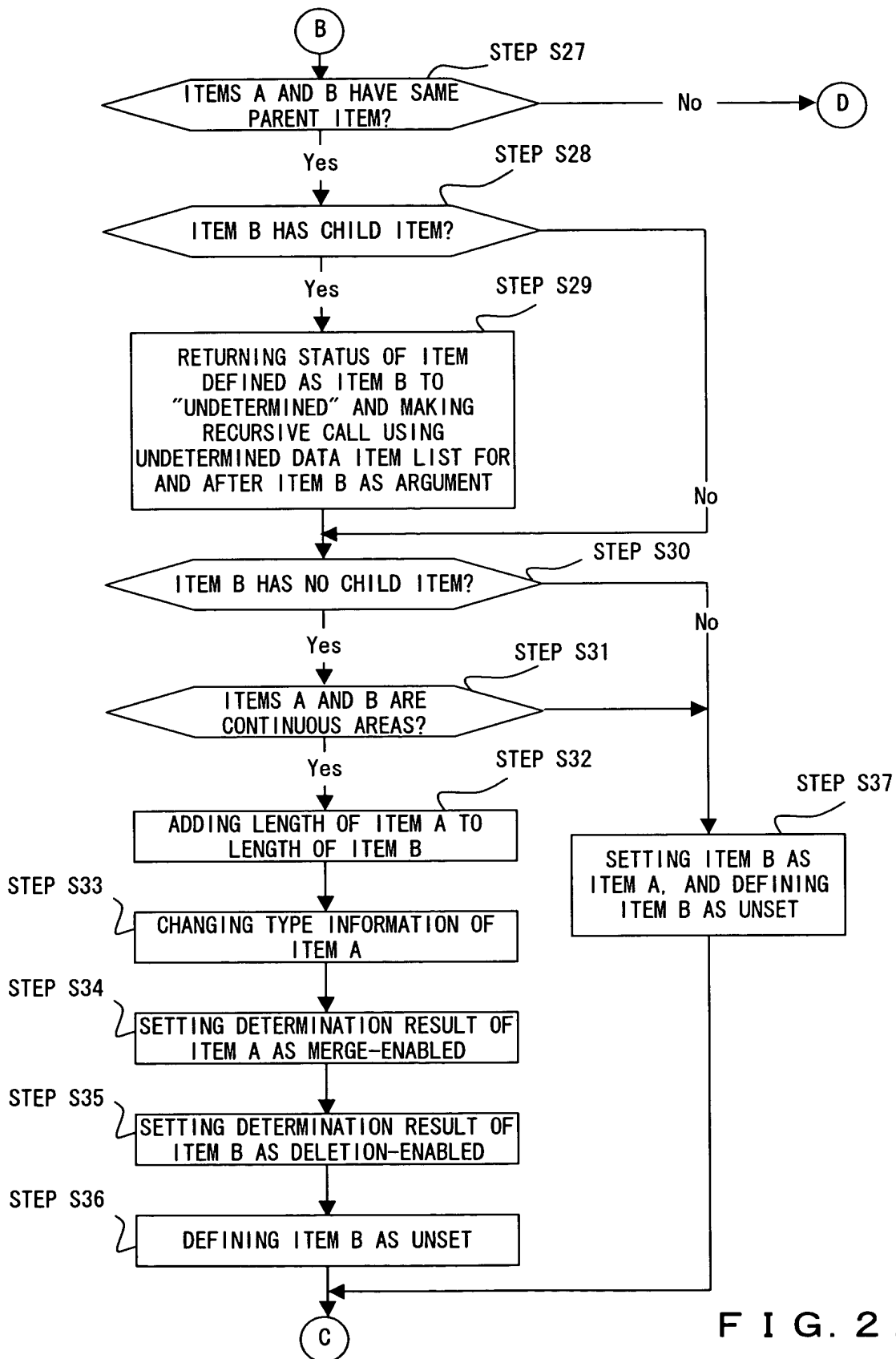
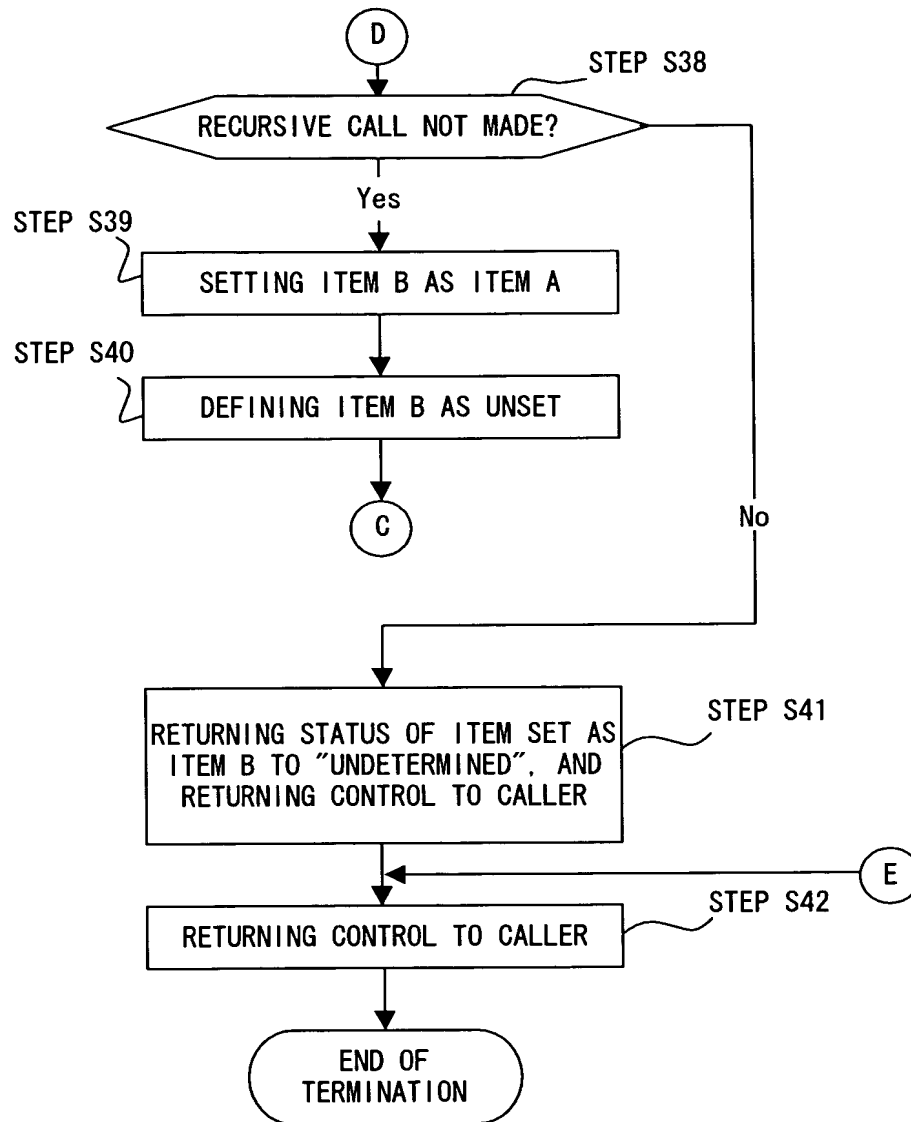


FIG. 21





F I G. 2 3

STAGE	Step	TEMPORARY STORAG AREA	ITEM A	ITEM B	UNDETERMINED DATA ITEM LIST
1	S00 (1)	—	—	—	IREC01 (UNDETERMINED, -), IDATA11 (UNDETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
2	S11 (0)	—	$\phi$	—	IREC01 (UNDETERMINED, -), IDATA11 (UNDETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
3	S12 (0)	—	$\phi$	$\phi$	IREC01 (UNDETERMINED, -), IDATA11 (UNDETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
4	S14 (0)	IREC01	$\phi$	$\phi$	IREC01 (DETERMINED, -), IDATA11 (UNDETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
5	S16 (0)	IREC01	IREC01	$\phi$	IREC01 (DETERMINED, -), IDATA11 (UNDETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
6	S14 (0)	IDATA11	IREC01	$\phi$	IREC01 (DETERMINED, -), IDATA11 (DETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
7	S17 (0)	IDATA11	IREC01	IDATA11	IREC01 (DETERMINED, -), IDATA11 (DETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)

F I G. 2 4



[RECURSIVE CALL FROM S19]					
8	S00 (1)	—	—	—	IDATA11 (UNDETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
9	S11 (1)	—	$\phi$	—	IDATA11 (UNDETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
10	S12 (1)	—	$\phi$	$\phi$	IDATA11 (UNDETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
11	S14 (1)	IDATA11	$\phi$	$\phi$	IDATA11 (DETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
12	S16 (1)	IDATA11	IDATA11	$\phi$	IDATA11 (DETERMINED, -), IDATA12 (UNDETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
13	S14 (1)	IDATA12	IDATA11	$\phi$	IDATA11 (DETERMINED, -), IDATA12 (DETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
14	S17 (1)	IDATA12	IDATA11	IDATA12	IDATA11 (DETERMINED, -), IDATA12 (DETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)

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15	S34 (1)	IDATA12	IDATA11	IDATA12	IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, -), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
16	S35 (1)	IDATA12	IDATA11	IDATA12	IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
17	S36 (1)	IDATA12	IDATA11	$\phi$	IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (UNDETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
18	S14 (1)	IDATA13	IDATA11	$\phi$	IDATA11 (DETERMINED, MERGED-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
19	S17 (1)	IDATA13	IDATA11	IDATA13	IDATA11 (DETERMINED, MERGED-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, -), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
20	S35 (1)	IDATA13	IDATA11	IDATA13	IDATA11 (DETERMINED, MERGED-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
21	S36 (1)	IDATA13	IDATA11	$\phi$	IDATA11 (DETERMINED, MERGED-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (UNDETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)

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22	S14(1)	IDATA14	IDATA11	$\phi$	IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
23	S17(1)	IDATA14	IDATA11	IDATA14	IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, -), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
24	S35(1)	IDATA14	IDATA11	IDATA14	IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
25	S36(1)	IDATA14	IDATA11	$\phi$	IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
26	S14(1)	WDATA12	IDATA11	$\phi$	IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
27	S17(1)	WDATA12	IDATA11	WDATA12	IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
[RECOVERY FROM RECURSIVE CALL]					
28	S19(0)	IDATA11	IREC01	IDATA11	IREC01 (DETERMINED, -), IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),

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29	S22 (0)	IDATA11	IREF01	IDATA11	IREF01 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, MERGE-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREF02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
30	S23 (0)	IDATA11	IREF01	IDATA11	IREF01 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREF02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
31	S24 (0)	IDATA11	IREF01	φ	IREF01 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (UNDETERMINED, -), WDATA13 (UNDETERMINED, -), WREF02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
32	S14 (1)	WDATA12	IREF01	φ	IREF01 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, -), WDATA13 (UNDETERMINED, -), WREF02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
33	S17 (0)	WDATA12	IREF01	WDATA12	IREF01 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, -), WDATA13 (UNDETERMINED, -), WREF02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
34	S39 (0)	WDATA12	WDATA12	WDATA12	IREF01 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, -), WDATA13 (UNDETERMINED, -), WREF02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),
35	S40 (0)	WDATA12	WDATA12	φ	IREF01 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, -), WDATA13 (UNDETERMINED, -), WREF02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -),

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36	S14 (0)	WDATA13	WDATA12	$\phi$	IRECO1 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, -), WDATA13 (DETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
37	S17 (0)	WDATA13	WDATA12	WDATA13	IRECO1 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, -), WDATA13 (DETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
38	S34 (0)	WDATA13	WDATA12	WDATA13	IRECO1 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, MERGE-ENABLED), WDATA13 (DETERMINED, -), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
39	S35 (0)	WDATA13	WDATA12	WDATA13	IRECO1 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, MERGE-ENABLED), WDATA13 (DETERMINED, DELETION-ENABLED), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
40	S36 (0)	WDATA13	WDATA12	$\phi$	IRECO1 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, MERGE-ENABLED), WDATA13 (DETERMINED, DELETION-ENABLED), WREC02 (UNDETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
41	S14 (0)	WREC02	WDATA12	$\phi$	IRECO1 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, MERGE-ENABLED), WDATA13 (DETERMINED, DELETION-ENABLED), WREC02 (DETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)
42	S17 (0)	WREC02	WDATA12	WREC02	IRECO1 (DETERMINED, MERGE-ENABLED), IDATA11 (DETERMINED, DELETION-ENABLED), IDATA12 (DETERMINED, DELETION-ENABLED), IDATA13 (DETERMINED, DELETION-ENABLED), IDATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, MERGE-ENABLED), WDATA13 (DETERMINED, DELETION-ENABLED), WREC02 (DETERMINED, -), WDATA21 (UNDETERMINED, -), WDATA22 (UNDETERMINED, -)

FIG. 29

43	S39 (0)	WREC02	WREC02	WREC02	I REC01 (DETERMINED, MERGE-ENABLED), I DATA11 (DETERMINED, DELETION-ENABLED), I DATA12 (DETERMINED, DELETION-ENABLED), I DATA13 (DETERMINED, DELETION-ENABLED), I DATA14 (DETERMINED, DELETION-ENABLED), W DATA12 (DETERMINED, MERGE-ENABLED), W DATA13 (DETERMINED, DELETION-ENABLED), W REC02 (DETERMINED, -), W DATA21 (UNDETERMINED, -), W DATA22 (UNDETERMINED, -)
44	S40 (0)	WREC02	WREC02	$\phi$	I REC01 (DETERMINED, MERGE-ENABLED), I DATA11 (DETERMINED, DELETION-ENABLED), I DATA12 (DETERMINED, DELETION-ENABLED), I DATA13 (DETERMINED, DELETION-ENABLED), I DATA14 (DETERMINED, DELETION-ENABLED), W DATA12 (DETERMINED, MERGE-ENABLED), W DATA13 (DETERMINED, DELETION-ENABLED), W REC02 (DETERMINED, -), W DATA21 (UNDETERMINED, -), W DATA22 (UNDETERMINED, -)
45	S14 (0)	W DATA21	W REC02	$\phi$	I REC01 (DETERMINED, MERGE-ENABLED), I DATA11 (DETERMINED, DELETION-ENABLED), I DATA12 (DETERMINED, DELETION-ENABLED), I DATA13 (DETERMINED, DELETION-ENABLED), I DATA14 (DETERMINED, DELETION-ENABLED), W DATA12 (DETERMINED, MERGE-ENABLED), W DATA13 (DETERMINED, DELETION-ENABLED), W REC02 (DETERMINED, -), W DATA21 (DETERMINED, -), W DATA22 (UNDETERMINED, -)
46	S17 (0)	W DATA21	W REC02	W DATA21	I REC01 (DETERMINED, MERGE-ENABLED), I DATA11 (DETERMINED, DELETION-ENABLED), I DATA12 (DETERMINED, DELETION-ENABLED), I DATA13 (DETERMINED, DELETION-ENABLED), I DATA14 (DETERMINED, DELETION-ENABLED), W DATA12 (DETERMINED, MERGE-ENABLED), W DATA13 (DETERMINED, DELETION-ENABLED), W REC02 (DETERMINED, -), W DATA21 (DETERMINED, -), W DATA22 (UNDETERMINED, -)
【RECURSIVE CALL FROM S19】					
47	S00 (1)	-	-	-	W DATA21 (UNDETERMINED, -), W DATA22 (UNDETERMINED, -),
48	S11 (1)	-	$\phi$	-	W DATA21 (UNDETERMINED, -), W DATA22 (UNDETERMINED, -),
49	S12 (1)	-	$\phi$	$\phi$	W DATA21 (UNDETERMINED, -), W DATA22 (UNDETERMINED, -),
50	S14 (1)	W DATA21	$\phi$	$\phi$	W DATA21 (DETERMINED, -), W DATA22 (UNDETERMINED, -),
51	S16 (1)	W DATA21	W DATA21	$\phi$	W DATA21 (DETERMINED, -), W DATA22 (UNDETERMINED, -),
52	S14 (1)	W DATA22	W DATA21	$\phi$	W DATA21 (DETERMINED, -), W DATA22 (DETERMINED, -),
53	S34 (1)	W DATA22	W DATA21	W DATA22	W DATA21 (DETERMINED, MERGE-ENABLED), W DATA22 (DETERMINED, -),
54	S35 (1)	W DATA22	W DATA21	W DATA22	W DATA21 (DETERMINED, MERGE-ENABLED), W DATA22 (DETERMINED, DELETION-ENABLED),

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55	S36 (1)	WDATA22	WDATA21	$\phi$	WDATA21 (DETERMINED, MERGE-ENABLED), WDATA22 (DETERMINED, DELETION-ENABLED),
[RECOVERY FROM RECURSIVE CALL]					
56	S19 (0)	WDATA21	WREC02	WDATA21	I REC01 (DETERMINED, MERGE-ENABLED), I DATA11 (DETERMINED, DELETION-ENABLED), I DATA12 (DETERMINED, DELETION-ENABLED), I DATA13 (DETERMINED, DELETION-ENABLED), I DATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, MERGE-ENABLED), WDATA13 (DETERMINED, DELETION-ENABLED), WREC02 (DETERMINED, -), WDATA21 (DETERMINED, MERGE-ENABLED), WDATA22 (DETERMINED, DELETION-ENABLED)
57	S22 (0)	WDATA21	WREC02	WDATA21	I REC01 (DETERMINED, MERGE-ENABLED), I DATA11 (DETERMINED, DELETION-ENABLED), I DATA12 (DETERMINED, DELETION-ENABLED), I DATA13 (DETERMINED, DELETION-ENABLED), I DATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, MERGE-ENABLED), WDATA13 (DETERMINED, DELETION-ENABLED), WREC02 (DETERMINED, MERGE-ENABLED), WDATA21 (DETERMINED, MERGE-ENABLED), WDATA22 (DETERMINED, DELETION-ENABLED)
58	S23 (0)	WDATA21	WREC02	WDATA21	I REC01 (DETERMINED, MERGE-ENABLED), I DATA11 (DETERMINED, DELETION-ENABLED), I DATA12 (DETERMINED, DELETION-ENABLED), I DATA13 (DETERMINED, DELETION-ENABLED), I DATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, MERGE-ENABLED), WDATA13 (DETERMINED, DELETION-ENABLED), WREC02 (DETERMINED, MERGE-ENABLED), WDATA21 (DETERMINED, DELETION-ENABLED), WDATA22 (DETERMINED, DELETION-ENABLED)
59	S24 (0)	WDATA21	WREC02	$\phi$	I REC01 (DETERMINED, MERGE-ENABLED), I DATA11 (DETERMINED, DELETION-ENABLED), I DATA12 (DETERMINED, DELETION-ENABLED), I DATA13 (DETERMINED, DELETION-ENABLED), I DATA14 (DETERMINED, DELETION-ENABLED), WDATA12 (DETERMINED, MERGE-ENABLED), WDATA13 (DETERMINED, DELETION-ENABLED), WREC02 (DETERMINED, MERGE-ENABLED), WDATA21 (DETERMINED, DELETION-ENABLED), WDATA22 (DETERMINED, DELETION-ENABLED)

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```
000010 IDENTIFICATION DIVISION.
000020 PROGRAM-ID. PRG1.
000030
000040 ENVIRONMENT DIVISION.
000050 INPUT-OUTPUT SECTION.
000060 FILE-CONTROL.
000070 SELECT IFILE01 ASSIGN SYSIN
000080 .
000090
000100 DATA DIVISION.
000110 FILE SECTION.
000120 FD IFILE01.
000130 01 FILLER PIC X(80). *>UNUSED, VARIABLE AFTER MERGE
000140* MERGE ↑
000150* MERGE ↑
000160* MERGE ↑
000170* MERGE ↑
000180 WORKING-STORAGE SECTION.
000190 01 WREC01.
000200 03 WDATA11 PIC 9(02).
000210 03 FILLER PIC 9(04). *>UNUSED, VARIABLE AFTER MERGE
000220* MERGE ↑
000230 03 WDATA14 PIC 9(02).
000240 01 FILLER PIC X(80). *>UNUSED, VARIABLE AFTER MERGE
000250* MERGE ↑
000260* MERGE ↑
000270 77 WDATA71 PIC 9(02). *>UNUSED
000280 77 WDATA72 PIC 9(02).
000290
000300 PROCEDURE DIVISION.
000310 MOVE 1 TO WDATA11 OF WREC01.
000320 MOVE 2 TO WDATA14 OF WREC01.
000330 COMPUTE WDATA72 = WDATA11 OF WREC01 + WDATA14 OF WREC01.
000340 DISPLAY WDATA72.
000350 STOP RUN.
```



TITLE: STORAGE MEDIUM STORING  
PROGRAM DIRECTING COMPUTER TO  
CONTROL OPTIMIZATION...  
INVENTORS: Masanori KIRA  
SERIAL NO.: Unassigned  
DOCKET NO.: 826.1897

```
000010 IDENTIFICATION DIVISION.
000020 PROGRAM-ID.      PRG1.
000030
000040 ENVIRONMENT      DIVISION.
000050 INPUT-OUTPUT      SECTION.
000060 FILE-CONTROL.
000070     SELECT IFILE01 ASSIGN SYSIN
000080 .
000090
000100 DATA              DIVISION.
000110 FILE                SECTION.
000120 FD  IFILE01.
000130 01  FILLER        PIC X(80).  *>UNUSED, VARIABLE AFTER MERGE
000140* MERGE ↑
000150* MERGE ↑
000160* MERGE ↑
000170* MERGE ↑
000180 WORKING-STORAGE SECTION.
000190 01 WREC01.
000200 03 WDATA11 PIC 9(02).
000210 03 FILLER PIC 9(04).  *>UNUSED, VARIABLE AFTER MERGE
000220* MERGE ↑
000230 03 WDATA14 PIC 9(02).
000240* DELETION
000250* MERGE ↑
000260* MERGE ↑
000270* DELETION
000280 77 WDATA72 PIC 9(02).
000290
000300 PROCEDURE          DIVISION.
000310     MOVE 1 TO WDATA11 OF WREC01.
000320     MOVE 2 TO WDATA14 OF WREC01.
000330     COMPUTE WDATA72 = WDATA11 OF WREC01 + WDATA14 OF WREC01.
000340     DISPLAY WDATA72.
000350     STOP RUN.
```

F I G. 3 3

```
#include <stdio.h>

struct {
    char  idata11[20]; /*UNUSED*/
    char  idata12[20]; /*UNUSED*/
    char  idata13[20]; /*UNUSED*/
    char  idata14[20]; /*UNUSED*/
} irec01;

void main(void) {
    struct {
        short wdata11;
        short wdata12; /*UNUSED*/
        short wdata13; /*UNUSED*/
        short wdata14;
    } wrec01;

    struct {
        char  wdata21[40]; /*UNUSED*/
        char  wdata22[40]; /*UNUSED*/
    } wrec02;

    short wdata71; /*UNUSED*/
    short wdata72;

    wrec01.wdata11 = 1;
    wrec01.wdata14 = 2;
    wdata72 = wrec01.wdata11 + wrec01.wdata14;
    printf("%d\n", wdata72);
}
```

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TITLE: STORAGE MEDIUM STORING  
PROGRAM DIRECTING COMPUTER TO  
CONTROL OPTIMIZATION...  
INVENTORS: Masanori KIRA  
SERIAL NO.: Unassigned  
DOCKET NO.: 826.1897

```
#include<stdio.h>

char irec01[80]: /*UNUSED. VARIABLE AFTER MERGE*/

void main(void){
    struct{
        short wdata11;
        char wdata12[4]: /*UNUSED. VARIABLE AFTER MERGE*/
        short wdata14;
    }wrec01;

    char wrec02[80]: /*UNUSED. VARIABLE AFTER MERGE*/

    short wdata71: /*UNUSED*/
    short wdata72;

    wrec01.wdata11 = 1;
    wrec01.wdata14 = 2;
    wdata72=wrec01.wdata11 + wrec01.wdata14;
    printf("%d\n",wdata72);
}
```

**F I G. 3 5**

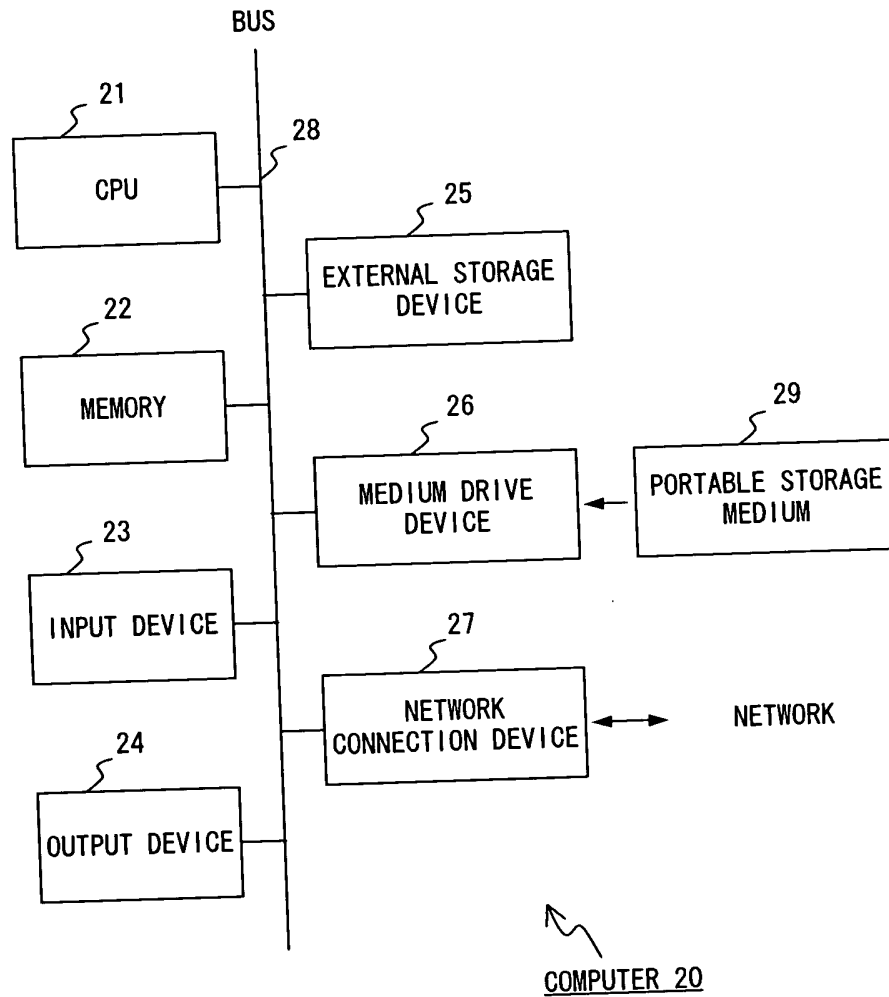
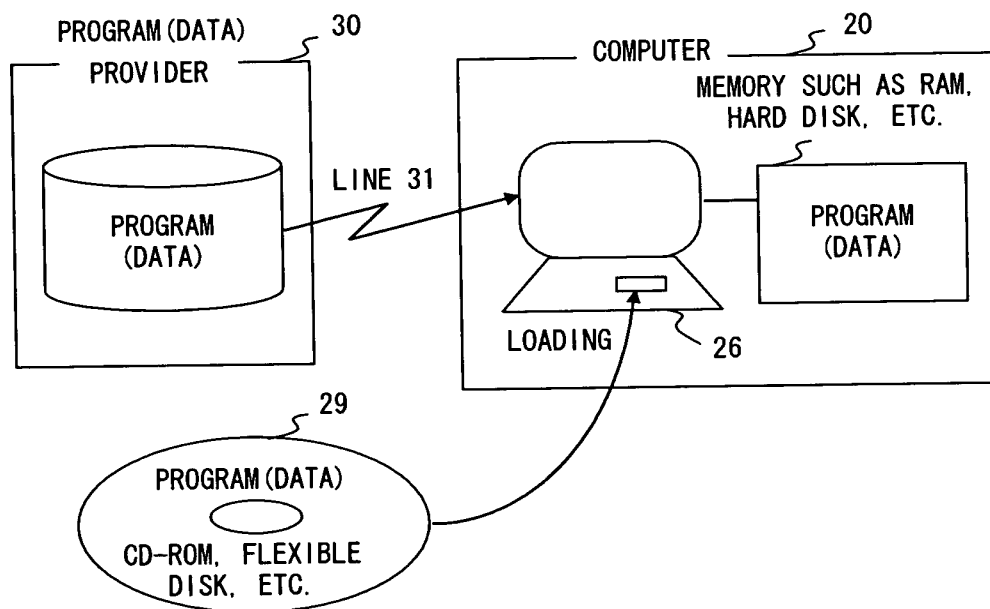


FIG. 36



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